

An Analytical Study of Angular Kinematical Variables during Execution of Toe-touch Skill among Various Levels Kabaddi Players – A Pilot Study

Jasvir Ram*, Joseph Singh

ABSTRACT

Aim of Study: The aim of this study was to find out the difference in selected angular kinematical variables during the execution of toe-touch skill among various level kabaddi players (raiders). **Material and Methods:** Twenty male raiders were selected for this study. The age of the subjects was ranged between 18 to 25 years. Selected angular kinematical variables: leading leg ankle joint, trailing leg ankle joint, leading leg knee joint, trailing leg knee joint were measured by Kinovea software. The normality of data was tested by Shapiro-Wilk test. One-way analysis of variance was applied to find out the difference for selected variables between various groups for normal data. Post-hoc test was applied for pairwise comparison. Kruskal Wallis test was applied for non-normal data. **Results:** Kruskal Wallis revealed that there was no significant difference in case of leading leg ankle joint ($p = .231$), leading leg knee joint ($p = .163$) and trailing leg knee joint ($p = .785$) variables among various levels kabaddi players during the execution of toe-touch skill. ANOVA revealed that there was significant difference in case of trailing leg ankle joint ($p = .011$) variable among various levels kabaddi players during the execution of toe-touch skill. **Conclusion:** The study concludes that junior national level raiders possess highest angle at trailing leg ankle joint during the execution of toe touch skill.

Keywords: Kabaddi, Raiders, Toe-touch skill, Biomechanics, Angular kinematics

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INTRODUCTION

Biomechanics is the science concerned about the inside and outer powers following up on human body and the impacts delivered by these powers.^[1] The role of biomechanics in accomplishing high performance cannot be ignored, since it is the lone scientific method which assists with recognizing the faults in performing technique precisely. There are basically two methods by which motor skill can be analyzed. They are qualitative and quantitative method. High-speed movie film for exactness has been used extensively to examine in great details the movements of the body, which occur too fast for the human eye to detect.^[2]

Kabaddi is combative team game, which is played all over India. In terms of success, this game is also getting a good status in Asian sports.^[3] It is also called the "game of masses," since spectators fully involve themselves and give a lot of consolation to the players.^[4,5] This game requires a high amount of physical fitness in the players to perform offensive push, falls, turns, sudden change of direction, holding, bending, bouncing, leg and hand touch, and maintaining holding and breath. A player of this game ought to have endurance, agility, individual proficiency, neuromuscular coordination, and mental toughness with the presence of mind on both attackers and defenders.^[6] There are many offensive and defensive skills in kabaddi which are used by defenders and raiders.

Kabaddi is perhaps the only combative sport in which attack is an individual attempt while defense is a group effort.^[7] Toe touch is an offensive skill which is used by the raider to touch the opponent during raid. While performing this skill, the raider requires to extend his leg suddenly toward the anti. He extends all the joints (knee and ankle) to cover more distance and touch with the inner portion of the toe.^[8]

Various studies have been conducted in kabaddi.^[9-15] However, the number of biomechanical studies in kabaddi is very less.^[16,17]

Department of Sports Biomechanics, Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India

Corresponding Author: Jasvir Ram, Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh, India. E-mail: jasvirram9@gmail.com

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Hence, this study was taken to find out the difference of selected angular kinematical variables during execution of raiding skill: Toe touch.

Aim of Study

The aim of the present study was to find out the difference in selected angular kinematical variables during the execution of toe-touch skill (TTS) between different level kabaddi players. It was hypothesized that there will be no significant difference in selected angular kinematical variables during the execution of TTS between different level kabaddi players.

MATERIALS AND METHODS

Twenty male raiders (5 College Level + 5 State Level + 5 Junior National Level + 5 Senior National Level) were selected for this study by purposive sampling technique from Punjab state. The age of the subjects was ranged between 18 and 25 years. All

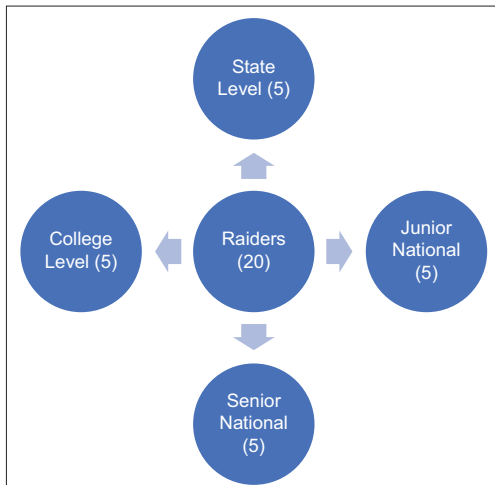


Figure 1: Description of division of subjects into groups

the subjects had knowledge and training experience in kabaddi (Figure 1).

Procedure

All the participants were informed in details about research protocol and the basic characteristics of the study. No special motivation technique was used to motivate the players before data collection. All the participants executed the same protocol under the same circumstances and were guided by researcher. To measure the performance of the TTS of raiders, instructions were given to raiders that they have to raid in opponents side and perform a TTS. Appropriate time was given to raiders and defenders for general and specific warm-up. Match situation was created and raiders were asked to raid. Three raids were given to every raider and best one was considered. Performance of every raid was recorded by “Y1-Action Camera.” The measurements of selected angular kinematical variables were done by digital software “Kinovea version-0.9.3” (Figure 2).^[18]

Statistical Technique

Shapiro–Wilk test was applied to test the normality of data. Descriptive statistics, that is, mean, median, standard deviation, and interquartile range were calculated. In case of normal data, one-way analysis of variance was applied to find out the difference between various groups. *Post hoc* test “Tukey” was applied for pairwise comparisons. In case of non-normal data, Kruskal–Wallis test was applied to find out the difference between various groups. All tests were employed with the help of SPSS software version 23. Level of significance was set at 0.05.

RESULTS

Table 1 shows that data are non-normal in case of leading leg ankle joint variable because junior national group ($P = 0.008$) has significant P -value. In case of trailing leg ankle joint variable, all groups have insignificant P -value ($P > 0.05$) which means that data are normal. In case of leading leg knee joint, data are non-normal because state level group has significant P -value ($P = 0.030$). In case of trailing leg knee joint variable, data are non-normal because state level group has significant P -value ($P = 0.045$).

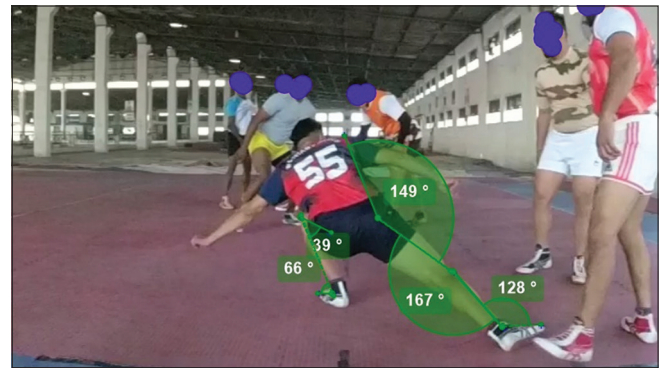


Figure 2: Subject performing toe-touch skill

Table 1: Shapiro–Wilk test for checking the normality of data

Variable	Group	Shapiro–Wilk statistic	df	Sig.
Leading leg ankle joint	College level	0.909	5	0.461
	State level	0.937	5	0.647
	Junior national	0.693	5	0.008
	Senior national	0.987	5	0.968
Trailing leg ankle joint	College level	0.950	5	0.734
	State level	0.977	5	0.919
	Junior national	0.812	5	0.101
	Senior national	0.957	5	0.785
Leading leg knee joint	College level	0.820	5	0.116
	State level	0.751	5	0.030
	Junior national	0.772	5	0.047
	Senior national	0.829	5	0.138
Trailing leg ankle joint	College level	0.917	5	0.509
	State level	0.770	5	0.045
	Junior national	0.843	5	0.173
	Senior national	0.969	5	0.866

Table 2: Descriptive statistics and P -values for selected angular kinematical variables

Variable	Intercollege	State level	Junior national	Senior national	p-value
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	
Leading leg ankle joint	147 (45.50)	119 (33)	135 (15)	144 (40)	0.231
Trailing leg ankle joint	74.60±16.27	62.80±12.07	96.60±20.91	63±11.49	0.011
Leading leg knee joint	171 (18)	179 (11)	175 (11)	176 (16.50)	0.163
Trailing leg knee joint	42 (39.50)	45 (55)	46 (44)	66 (55.50)	0.785

IQR: Interquartile range, SD: Standard deviation, (*): Denotes significant differences at 0.05 level of significance

Table 2 shows the mean, standard deviation, median, interquartile values, and P -values of selected angular kinematical variables. Mean and standard deviation values of trailing leg ankle joint variable in college level, state level, junior national level, and senior national level groups are 74.60 ± 16.27 , 62.80 ± 12.07 , 96.60 ± 20.91 , and 63 ± 11.49 , respectively. Median and interquartile range values of leading leg ankle joint variable in college level,

Table 3: Pairwise comparisons of trailing leg ankle joint variable

Recovery (I)	Recovery (J)	Mean difference (I-J)	Std. error	Sig. ^a	95% Confidence interval for difference ^a	
					Lower bound	Upper bound
College level	State level	11.80000	9.89848	0.251	-9.1839	32.7839
	Junior national	-22.00000*	9.89848	0.041	-42.9839	-1.0161
	Senior national	11.60000	9.89848	0.258	-9.3839	32.5839
State level	Junior national	-33.80000*	9.89848	0.004	-54.7839	-12.8161
	Senior national	-2.00000	9.89848	0.984	-21.1839	20.7839
Junior national	Senior national	33.60000*	9.89848	0.004	12.6161	54.5839

state level, junior national level, and senior national level groups are 147 (45.50), 119 (33), 135 (15), and 144 (40), respectively. Median and interquartile range values of leading leg knee joint variable in college level, state level, junior national level, and senior national level groups are 171 (18), 179 (11), 175 (11), and 176 (16.50), respectively. Median and interquartile range values of trailing leg knee joint variable in college level, state level, junior national level, and senior national level groups are 42 (39.50), 45 (55), 46 (44), and 66 (55.50), respectively. It also shows that there is an insignificant difference in case of leading leg ankle joint ($P = 0.231$), leading leg knee joint ($P = 0.163$), and trailing leg knee joint ($P = 0.785$) variables between various groups during the execution of TSS because $P > 0.05$ was considered. It also shows that there is a significant difference in case of trailing leg ankle joint ($P = 0.011$) variable between various groups during the execution of TSS because $P < 0.05$ was considered.

Table 3 shows that there is an insignificant difference between college level and state level raiders in case of trailing leg ankle joint variable during the execution of TSS. There is a significant difference between college level and junior national level raiders in case of trailing leg ankle joint variable during the execution of TSS. There is an insignificant difference between college level and senior national level raiders in case of trailing leg ankle joint variable during the execution of TSS. There is a significant difference between state level and junior national level raiders in case of trailing leg ankle joint variable during the execution of TSS. There is an insignificant difference between state level and senior national level raiders in case of trailing leg ankle joint variable during the execution of TSS. There is an insignificant difference between college level and junior national level raiders in case of trailing leg ankle joint variable during the execution of TSS. There is a significant difference between junior national level and senior national level raiders in case of trailing leg ankle joint variable during the execution of TSS.

DISCUSSION

In the present study, the assumption was that selected linear kinematical variables will be no significant difference between college level, state level, junior national level, and senior national level raiders during the execution of TTS. Four angular kinematical variables: Leading leg ankle joint, trailing leg ankle joint, leading leg knee joint, and trailing leg knee joint were taken in this study.

The result showed that there was an insignificant difference in leading leg ankle joint variable between college level, state level, junior national level, and senior national level raiders during the execution of TTS. The result of this finding is supported by the study conducted by Alam and Peter where they found that there was an insignificant difference between men and women in ankle joint during turnover phase under the barbell of snatch lift.^[19]

The results showed that there was an insignificant difference in trailing leg ankle joint variable between college level, state level, junior national level, and senior national level raiders during the execution of TTS. Junior national level raiders had highest angle and trailing leg knee joint during the execution of TSS. The results of these findings are supported by the study conducted by Alam and Peter where they found that there was a significant difference between men and women in ankle joint during initial position of snatch lift.^[19]

The result showed that there was an insignificant difference in leading knee joint variable between college level, state level, junior national level, and senior national level raiders during the execution of TTS. The result of this finding is supported by the study conducted by Ram where he found that there was an insignificant difference in leading leg knee joint between intercollege and interuniversity level players during execution of running hand touch skill.^[16]

The result showed that there was an insignificant difference in trailing leg knee joint variable between college level, state level, junior national level, and senior national level raiders during the execution of TTS. The result of this finding is supported by the study conducted by Alam and Peter where they found that there was an insignificant difference between men and women in knee joint during initial position of snatch lift.^[19]

CONCLUSION

The present study concludes that angle at trailing leg ankle joint varies in college level, state level, junior national level, and senior national level raiders during the execution of TTS.

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REFERENCES

1. Hay JG. The Biomechanics of sports Techniques. 4th ed. United States: Prentice-Hall; 1994. p. 402.
2. Moria M. A systematic approach to skill analysis. Sport science periodical on research and technology in sports. J Sports Sci 1990;4:198-232.
3. Arshaq CK, Martin M. Relationship of selected anthropometrical and motor fitness variables to performance of Kho-Kho players. Indian J

- Phys Educ Sports Med Exerc Sci 2018;18:18-20.
4. Dey SK, Khanna GL, Batra M. Morphological and physiological studies on Indian national Kabaddi players. *Br J Sports Med* 1993;27:237-42.
 5. Selva S, Karthi R, Aparna S, Kumar PM. Awareness, prevention and management of dental injuries among the Kabaddi players of Madurai district. *J Dent Res Rev* 2018;5:97.
 6. Nataraj HV, Chandrakumar M. Motor ability variables as predictors of performance of Kabaddi. *J Sports Sci* 2008;31:12-8.
 7. Gaurav V, Singh M, Singh S. A Comparative study of somatic traits and body composition between volleyball players and controls. *Indian J Sci Technol* 2011;4:116-8.
 8. Itoo MA, Jain R. The effect of clay and mat surface on coordinative and skill ability of the Kabaddi players. *Int Phys Educ Sports Health* 2020;7:214-9.
 9. Bhavya S, Hanumanthayya P. Relationship of selected physiological variables with Kabaddi playing ability among secondary school female Kabaddi players. *Int J Res Anal Rev* 2021;8:48-50.
 10. Devaraju K, Needhiraja A. Prediction of Kabaddi playing ability from selected anthropometrical and physical variables among college level players. *Int J Adv Res Eng Technol* 2012;3:115-20.
 11. Gnanachellam CJ. Comparative study of strength power coordination ability between Kabaddi and Kho-Kho players. *Element Educ Online* 2021;20:7255-7.
 12. Naik CA. Comparative study of Kabaddi skills in indoor and outdoor environment. *Aayushi Int Interdiscip Res J* 2018;5:117-9.
 13. Thakur, J. Association of obesity with agility and speed of university level Kabaddi players. *Intern J Phys Educ Sports Health* 2016;3:254-6.
 14. Johnson P. Predominance of Selected Anthropometric Measurements on Kabaddi Playing Ability among College Male Students. Vol. 15. Acharya Nagarjuna University; 2016. p. 76-9.
 15. Pandey SS, Sardar S. An estimation of Kabaddi performance on the basis of selected physical fitness components. *Indian J Phys Educ Sports Appl Sci* 2016;6:27-35.
 16. Ram J. Comparative study of angular kinematical variables during running hand touch skill among different level Kabaddi players. *Int J Yogic Hum Mov Sports Sci* 2019;4:1388-9.
 17. Ram J. Comparative study of linear kinematical variables during running hand touch skill among different level kabaddi players. *Int J Physiol Nutr Phys Educ* 2019;4:2207-8.
 18. Gogoi H, Rajpoot YS. Test-retest reliability of kinovea software. *Online Int Interdiscip Res J* 2019;9:184-9.
 19. Alam S, Peter VF. A comparative study of kinematical variables of snatch technique between men and women of Elite Indian weightlifters. *Int J Physiol Nutr Phys Educ* 2019;4:1578-84.